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THE THELEPHORACEAE OF NORTH AMERICA. VII ¹

SEPTOBASIDIUM

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SEPTOBASIDIUM

Septobasidium Patouillard, Jour. de Bot. 6:61. textf. 1892; Essai Taxon. Hym. 7. 1900; Sacc. Syll. Fung. 11:118. 1895; *ibid.* 14:215. 1900; *ibid.* 16:184. 1902; *ibid.* 17:203. 1905; *ibid.* 21:445. 1913. — Jola Möller, A., Bot. Mitth. a. d. Tropfen 8, Protobasidiomyceten 22–29. pl. 4. f. 4. 1895; Engl. & Prantl, Nat. Pflanzenfam. I.1** :84. 1897; Sacc. Syll. Fung. 14:245. 1900.

The genus was founded upon *Septobasidium pedicellatum* Pat. and *Septobasidium velutinum* Pat.

Fructifications resupinate, effused, coriaceous, producing probasidia upon the hyphae at or near the hymenial surface; the probasidia remain attached to the hyphae and either produce at the apex a few-celled, hyaline, spore-bearing filament, or elongate, become septate, and differentiate into such a filament, usually termed a transversely septate basidium; spores simple, hyaline, even, borne one to each cell by the terminal cell and next lower cells.

The spores are apparently produced in succession upon the spore-bearing organ rather than simultaneously, for in only two instances have I observed two spores present at the same time upon the same organ; in these the two spores were very unequal in size. One sees a spore attached to the terminal cell more frequently than to lower cells but perhaps

NOTE.—Explanation in regard to the citation of specimens studied is given in Part VI, Ann. Mo. Bot. Gard. 3:208, footnote. The technical color terms used in this work are those of Ridgway, Color Standards and Nomenclature. Washington, D. C., 1912.

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because of the more favorable position of the terminal cell. I have frequently observed a spore attached to some one or other of the upper three cells of the spore-bearing organ but have seen such attachment to the fourth cell only in *S. castaneum*, although often noting on the fourth cell in some species a lateral protuberance similar to those to which spores were attached in the upper cells. The spore-bearing stage is apparently of very brief duration, judging by the few collections which show this stage well. Specimens are usually collected sterile or with probasidia. It is hoped that the record given as to the month when each of our species has been collected in spore-bearing condition may aid in securing more valuable specimens for study in the future.

Septobasidium is not one of the genera of the *Thelephoraceae*, for its spore-producing organs are not simple basidia. The genus is treated here merely for the convenience of students of the *Thelephoraceae*, as in the case of *Tremelodendron*, *Eichleriella*, and *Sebacina*. The coriaceous structure and resupinate habit of the species of *Septobasidium* are so similar to those of *Corticium* and other resupinate genera of the *Thelephoraceae* that examination by the microscope of sections of the fructification is necessary to distinguish an unfamiliar species of *Septobasidium* from *Corticium*, etc. Many of the known species of *Septobasidium* were originally published as *Corticiums* and *Thelephoras*, and it is probable that careful study of authentic specimens of the earlier species of these genera will lead to the transfer of additional species to *Septobasidium*. It is possible that some authors may have mistaken the pyriform to globose probasidia of species of *Septobasidium* for conidia and have published such species as *Hyphomycetes*. The probasidia may be distinguished from hyphomycetous spores by the former bodies remaining attached to the hyphae; the probasidia do not float about loose in preparations.

I am indebted to Dr. R. P. Burke for transmitting to me in fresh condition spore-bearing material of three species of *Septobasidium*. Spore falls were obtained from this material for germination experiments and some material was

fixed and preserved for a cytological study of *Septobasidium* during spore production. Discussion of the systematic relationships of *Septobasidium* may well await the completion of such study.

The species of *Septobasidium* are tropical or subtropical. Extreme northern stations, based on specimens examined by the writer, are London, Ontario, Canada, and Madison, Wisconsin—both are stations for *S. pseudopedicellatum*, which is the most frequent species of the United States.

With regard to the biology of *Septobasidium*, several specimens of this genus—usually of *S. pseudopedicellatum*—have been noted by their respective collectors as occurring especially on plants badly affected by scale insects. Other specimens show scale insects numerous about the fructification and overrun by it. Petch¹ in a note on the biology of *Septobasidium* states that from examination of a long series of specimens, it has been determined that these fungi are parasitic on colonies of scale insects which they overgrow and destroy completely, and that these fungi live, not on secretions of the insects, but upon the insects themselves.

In addition to independent observations on the association of *Septobasidium* with scale insects, other facts tending to show an entomogenous adaptation of *Septobasidium* are the following:

(1) All species of *Septobasidium* known to the writer occur only on living branches or leaves, and in no instance has there been penetration by the fungus through the epidermis or bark into the living tissues of the substratum, or any injury or deformation or gall response by the branch or leaf.

(2) Spores are produced by *S. pseudopedicellatum*, in the region from North Carolina and Alabama to Porto Rico, in May when young colonies of the scale insects are forming. Mr. Seagle wrote to me that the old fructifications of *S. pseudopedicellatum* disappear from his apple trees in North Carolina in late spring and in early summer, and new fruc-

¹Ann. Bot. 25:843. 1911.

tifications grow which become large by early winter. The collections which I have studied, made during fall and early winter, have been in vegetative rather than in fruiting stage.

On the other hand, some specimens of *Septobasidium* in herbaria have no scale insects on the portions of twigs bearing the fructifications of *Septobasidium*, but I can not say as to whether these fructifications made their start on clean twigs or on scattered scale insects which they have completely overgrown and destroyed.

KEY TO THE SPECIES

- Fructification having the hymenial layer or membrane raised above the substratum and supported on scattered pillars composed of parallel hyphae close together side by side..... 1
- Fructification having the hymenial layer supported on pillars but with the pillars less regular in form than in the above and composed of loosely interwoven and curving hyphae. Known from Cuba.....10. *S. citratum*
- Fructification lacking supporting hyphal pillars, with hyphae extending from substratum to the hymenial region without noteworthy consolidation 5
1. With erect or suberect paraphyses or hyphal branches at the surface of the hymenium 2
 1. With surface of hymenium composed of longitudinally arranged and interwoven paraphyses or hyphal branches..... 3
 1. Structure of surface of hymenium not published; probasidia $20 \times 15-20\mu$, persistent at the base of the spore-bearing organs; spore-bearing organs horseshoe-shaped, $35 \times 10\mu$. In Cuba1. *S. pedicellatum*
 1. Structure of surface of hymenium not published; fructification black, shining, very thin. In Guadeloupe.9. *S. atratum*
 2. Fructification $\frac{1}{4}-\frac{1}{2}$ mm. thick; probasidia $12 \times 7-9\mu$; spore-bearing organs $20-25 \times 4\frac{1}{2}-5\mu$ 2. *S. Schweinitzii*
 2. Fructification $1-1\frac{1}{2}$ mm. thick; probasidia $26 \times 11\mu$; spore-bearing organs hook-shaped, up to $50 \times 8\mu$. In Mexico3. *S. tropicale*
 2. Fructification $1-1\frac{1}{2}$ mm. thick; probasidia $13-25 \times 10-13\mu$; spore-bearing organs straight, up to $60 \times 11\mu$; spores $13 \times 5\frac{1}{2}\mu$. In Jamaica....
.....8. *S. jamaicaense*
 2. Fructification not shining, velutinous, aniline-black, becoming fuscous in the herbarium; probasidia $15-20\mu$ in diameter7. *S. Patouillardii*
 3. Fructification glabrous, shining..... 4
 4. Varying from avellaneous and wood-brown to cinnamon-brown; probasidia $12-20 \times 8-15\mu$; spores $17-22 \times 4-5\mu$ 4. *S. pseudopedicellatum*
 4. Vandyke brown when in vegetative condition, olive-brown when fertile; probasidia $11-15 \times 9-10\mu$; spores $12 \times 3-3\frac{1}{2}\mu$ 5. *S. castaneum*
 4. Olive-brown darkening to dark neutral gray; probasidia and spores unknown. In Nicaragua.6. *S. subtilacinum*
 5. Fructification divided into many narrow, sinuous divisions, better shown toward the margin 6
 5. Fructification not divided but with surface reticulated with obtuse veins; at first drab or Prout's brown then Chaetura-drab.....13. *S. retiforme*
 5. Fructification neither divided nor veined 7

6. Plumbeous when bright colored, often smoke-gray or pallid mouse-gray, velutinous11. *S. Langloisii*
6. Honey-yellow to old gold, velutinous12. *S. frustulosum*
7. Hymenial crust glabrous, between mouse-gray and hair-brown; middle region spongy, lacunose; fructification $1\frac{1}{2}$ -2 mm. thick. In Cuba.....14. *S. Spongia*
7. Fructification tomentose, between mouse-gray and hair-brown; probasidia $12-15\mu$ in diameter; spores $12-15 \times 5-6\mu$15. *S. fumigatum*
7. Fructification pubescent, white at first, pale olive-buff in the herbarium; probasidia $15-17\mu$ in diameter; spores $15-20 \times 5\frac{1}{2}-6\mu$. In California....16. *S. canescens*
7. Fructification velutinous, between lilac-gray and pallid smoke-gray; probasidia up to 9μ in diameter; spores $11-13 \times 3\frac{1}{2}-4\frac{1}{2}\mu$. In Trinidad.....17. *S. lilacinum*

1. **Septobasidium pedicellatum** Patouillard, Jour. de Bot. 6:61. *textf.* 1892.

Thelephora pedicellata of C. Wright's Cuban Exsiccati, but not of Schweinitz.

Type: in Museum of Paris.

Fructification with pillars or pedicels composed of hyphae which branch towards the upper end and pass into and support the hymenial crust; probasidia subglobose, $20 \times 15-20\mu$, arising as lateral outgrowths near the ends of the final branches of the hyphae, producing from the apex a hyaline, cylindric, spore-bearing organ, $35 \times 10\mu$, 2-3-septate, which becomes horseshoe-shaped, slightly constricted at the septa, and has a small protruberance on the convex side of each cell; no spores seen.

The above is a summary of the account by Patouillard,¹ of the structure of the specimen in the Museum of Paris, collected in Cuba by C. Wright and distributed by him in his Cuban exsiccati under the name *Thelephora pedicellata*. Wright made two collections in Cuba which were determined by Berkeley and Curtis² as *Thelephora pedicellata*. Since Patouillard omitted the data on the label of the specimen which he studied, I do not know now which of Wright's numbers is the type collection and have to defer a fuller consideration of this species to the supplement to my monograph.

¹*Loc. cit.*

²Linn. Soc. Bot. Jour. 10:329. 1868.

2. *S. Schweinitzii* Burt, n. sp.

Thelephora pedicellata Schweinitz, Naturforsch. Ges. Leipzig Schrift. 1:108. pl. 2. f. 3. 1822; Fries, Elenchus Fung. 1:200. 1828; Epier. 544. 1838; Sacc. Syll. Fung. 6:544. 1888. Not *Septobasidium pedicellatum* Pat.

Illustrations: Schweinitz, *loc. cit.*

Type: in Herb. Schweinitz.

Fructification resupinate, coriaceous, dry, not separable from the substratum, varying from drab and cinnamon-drab

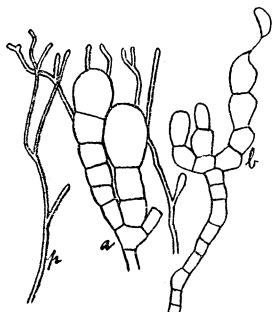


Fig. 1

S. Schweinitzii.

a, portion of hymenium showing paraphyses and two probasidia; b, spore-bearing organ and spore; p, paraphysis. $\times 640$.

to wood-brown, the margin undulate, whitish; in structure 3-layered, with (1) a layer next to the substratum of densely interwoven, colored hyphae $3-3\frac{1}{2}\mu$ in diameter, which form (2) a layer of erect hyphal pillars or pedicels each about $200-300\mu$ long, $40-75\mu$ in diameter, about 2 to a millimeter, and pass into and support at the outer end (3) the hymenial layer $120-200\mu$ thick, composed of densely interwoven, colored hyphae $3-3\frac{1}{2}\mu$ in diameter, of erect, flexuous, filiform, sparingly branched, hyaline paraphyses or hyphal branches about $1\frac{1}{2}\mu$ in diameter, and, when in fertile stage, of hyaline, thin-walled, erect probasidia, pyriform to subglobose, $12 \times$

$7-9\mu$ in the type, borne on the colored hyphae; spores simple, hyaline, even, curved, $5 \times 2\frac{1}{2}\mu$ (as seen attached in the type but perhaps immature), borne singly at the apex of the terminal cell of a short filament $20-25 \times 4\frac{1}{2}-5\mu$, about 4 cells long, curved to fish-hook-shaped in form, which develops from the probasidium.

Fructifications 2 – several cm. long, 1 – several cm. broad, $\frac{1}{3}-\frac{1}{2}$ mm. thick.

On living branches. North Carolina to Louisiana. Frequent in winter.

The above description is based on the Schweinitzian type and presents the characters of a rare species which has not been distinguished heretofore from the following *S. pseudo-pedicellatum*, a thicker, larger, common, and widely distributed species. *S. Schweinitzii* is characterized by its erect filiform paraphyses, curved to hook-shaped, spore-bearing organs, and small spores, although it is not certain that full-sized mature spores have yet been seen.

I refer to *S. Schweinitzii* a collection made by P. L. Ricker on *Persea*, in Georgia, during August, because this specimen has small probasidia, hook-shaped, few-celled, hyaline, spore-bearing organs, and spores $7 \times 3\frac{1}{2}\mu$; but in this specimen only a few paraphyses are present, the probasidia and hook-shaped organs are at the very surface of the hymenium, and small, globose organs 5μ in diameter are occasionally present, borne laterally on the hyphae in the lower part of the hymenial layer. I have not studied with the microscope the Cuban specimen of *S. pedicellatum*, collected by C. Wright, one of the species upon the structure of which Patouillard founded the genus *Septobasidium*. He found this specimen to have probasidia and hook-shaped organs. Both probasidia and the hyaline organs are described as larger than they measure in the Schweinitzian type. In the Cuban specimen the probasidia are stated to be 20μ in diameter or $20 \times 15\mu$, and the hook-shaped organs as $35 \times 10\mu$, and the former persist full size, with the septate hook-shaped organs connected with them like a promycelium with its teleutospore. These differences indicate that the Cuban specimen belongs to a species distinct from *Thelephora pedicellata* Schw. It is necessary to substitute a new specific name for "pedicellata" in making the transfer of *Thelephora pedicellata* Schw. to *Septobasidium*, because there is already a valid *Septobasidium pedicellatum*.

Specimens examined:

North Carolina: *Schweinitz*, type (in Herb. Schw.).

Georgia: Bugaboo Island, Okefenokee Swamp, P. L. Ricker, 921.

Louisiana: Gibson, *F. T. McLean*, comm. by P. Spaulding.

3. *S. tropicale* Burt, n. sp.

Type: in Mo. Bot. Gard. Herb. and in Farlow Herb.

Fructification resupinate, effused, coriaceous, dry, not separable from substratum, glabrous, not shining, avellaneous, the margin concolorous, squamulose-fimbriate, not closely ad-

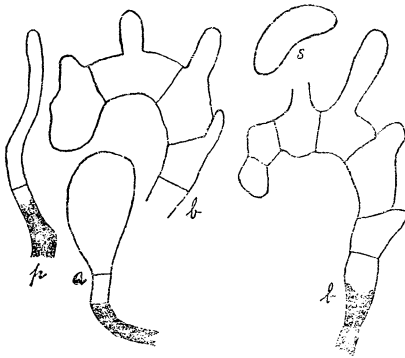


Fig. 2

S. tropicale.

a, probasidium; *b*, two spore-bearing organs; *s*, spore; *p*, paraphysis. $\times 640$.

nate; in structure 3-layered, with (1) a layer next to the substratum of densely interwoven, concolorous, thick-walled hyphae $3-3\frac{1}{2}\mu$ in diameter, which pass into and form (2) a layer of numerous erect, slender pillars about 40μ in diameter, 5 or 6 to the millimeter, whose hyphae spread apart at the outer end, branch, and form and support (3) the hymenial crust about 200μ thick, densely interwoven through-

out, with the even, thick-walled, colored hyphae up to 6μ in diameter on the under side, more erect, paler, and about 2μ in diameter at the surface; probasidia terminal on the hyphae, hyaline or but slightly colored, pyriform, $26 \times 11\mu$, at the surface of the hymenium; a spore partially imbedded in the hymenium is hyaline, simple, even, curved, $19 \times 6\mu$, no others seen; fish-hook-shaped organs, such as probably bear the spores, are present in the surface of the hymenium, several-celled, up to $50 \times 8\mu$, with prominent protuberances from cells on the convex side of the organ.

Fructification 4 cm. long, about 2 cm. broad, $1-1\frac{1}{2}$ mm. thick.

On bark of living branches of *Quercus*. Mexico.

The distinctive characters of this species are avellaneous color, surface not shining, margin squamulose-fimbriate, not closely adnate as in the preceding species, and thicker hy-

menial crust not loosely interwoven on its under sides, probasidia terminal on the hyphae, and the large hook-shaped, presumably spore-bearing, organs of the upper surface. If these organs grow out from the probasidia, the probasidium must differentiate into the organ, for I have traced the curved organ back to the colored hyphal cells.

Specimens examined:

Mexico: locality not stated, *C. G. Pringle*, comm. by W. G. Farlow, 5 (in Mo. Bot. Gard. Herb., 44590).

4. *S. pseudopedicellatum* Burt, n. sp.

Thelephora pedicellata of most American authors but not of Schweinitz.

Type: in Mo. Bot. Gard. Herb.

Fructification resupinate, effused, coriaceous, dry, not separable from the substratum, varying from avellaneous and

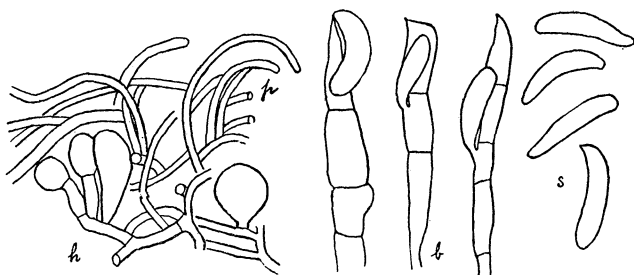


Fig. 3

S. pseudopedicellatum.

h, portion of hymenium showing the longitudinally interwoven hyphal ends or paraphyses and some probasidia; *b*, three spore-bearing organs; *s*, spores. $\times 640$.

wood-brown to cinnamon-brown, the margin undulate, whitish; in structure three-layered, with (1) a layer next to the substratum of densely interwoven, thick-walled, slightly colored hyphae 3μ in diameter, which form (2) a layer of erect, hyphal pillars, or pedicels, each about 500μ long, $20\text{--}40\mu$ in diameter, about 3–5 to a millimeter, whose hyphae spread apart at the upper end of the pillars, branch, and form and support (3) the hymenial crust about 300μ thick, with hyphae loosely interwoven near the pillars, $3\text{--}3\frac{1}{2}\mu$ in

diameter, very dense at the outer surface with the hyphal branches or paraphyses 2μ in diameter, curved longitudinally along the surface and densely interwoven; erect probasidia nearly hyaline, rich in protoplasm, deeply staining, pyriform, $12-20 \times 8-15\mu$, are borne laterally on the hyphae about 15μ below the surface of the hymenium; spores white in a spore collection, simple, even, curved, $17-22 \times 4-5\mu$, are borne singly from each of the upper three cells (so far as observed) of a straight or flexuous, few-celled, hyaline organ up to $60 \times 5-5\frac{1}{2}\mu$, which grows from the probasidium and protrudes above the surface of the hymenium.

Fructifications 2-15 cm. long, 1-8 cm. broad, $1-1\frac{1}{2}$ mm. thick.

On small, living branches of apple, orange, oak, *Nyssa*, *Cornus*, *Liquidambar*, and also on orange leaves in one collection; sometimes, perhaps always, associated with scale insects. Canada to Florida and Louisiana and westward to Wisconsin; also in Cuba and Porto Rico. December to August; spores produced in the last of May.

S. pseudopedicellatum is the common *Septobasidium* of southeastern United States. It may be recognized by its brown, glabrous, shining, foliaceous crust which is raised and supported about a millimeter above the substratum on perpendicular, hyphal pillars which are as conspicuous as the rhizoids of a lichen. Old specimens may crack, break the hyphal pillars, and the hymenial crust curl outward so as to show the broken pillars attached to the under side. Sterile specimens of this species have been heretofore referred to *S. pedicellatum*, but a collection of fertile specimens received from Dr. R. P. Burke in May of the present year shows that our common species differs from *S. pedicellatum* by having large spores produced on a straight or but slightly curved, much larger, spore-bearing organ, paraphyses or hyphal branches at the surface of the hymenium curved and densely longitudinally interwoven, larger probasidia, and larger and thicker fructifications. Even in sterile condition the longitudinally interwoven paraphyses are sufficiently distinctive.

Specimens examined:

Exsiccati: Ellis, N. Am. Fungi, 12, under the name *Thelephora pedicellata*.

Canada: Ontario, London, *J. Dearness*, 3396 (in Mo. Bot. Gard. Herb., 43802).

New Jersey: Newfield, *J. B. Ellis*; also from same locality in Ellis, N. Am. Fungi, 12.

Pennsylvania: Trexlertown, *W. Herbst*, comm. by Lloyd Herb., 2232.

North Carolina: Reepsville, *J. P. Seagle*, two collections, one of which was communicated by F. L. Stevens.

Florida: *W. W. Calkins*; Daytona, *R. Thaxter*, 75a (in Farlow Herb. and in Mo. Bot. Gard. Herb., 43894); Kissimmee, comm. by F. C. Wolf (in Mo. Bot. Gard. Herb., 44205); same locality, *B. E. Evans* (in Mo. Bot. Gard. Herb., 44403); Ft. Myers, *H. S. Fawcett* (in Fawcett Herb.); Gainesville, *H. E. Stevens*, comm. by E. Bartholomew, 40b (in Mo. Bot. Gard. Herb., 44212).

Alabama: *Peters*, 75 (in Curtis Herb.); *F. S. Earle & C. F. Baker* (in Lloyd Herb., 3454); Auburn, *Alabama Biological Survey*; Montgomery, *R. P. Burke*, 49, and the type collection (in Mo. Bot. Gard. Herb., 10979, and 20659, type).

Louisiana: Gibson, *F. T. McLean*, comm. by P. Spaulding; St. Martinville, *A. B. Langlois*, three collections, two of which are (in Lloyd Herb., 2411, 3533).

Kentucky: comm. by A. H. Gilbert (in Mo. Bot. Gard. Herb., 44323); "in mountains," *P. Garman* (in Mo. Bot. Gard. Herb., 44302).

Wisconsin: Madison, *W. Trelease* (in Mo. Bot. Gard. Herb., 5164).

Cuba: Ceballos, *H. S. Fawcett*, 10, 39 (in Mo. Bot. Gard. Herb., 15005, 15018); Isle of Pines, *H. S. Fawcett*, 15 (in Mo. Bot. Gard. Herb., 15094).

Porto Rico: Mayaguez, *F. S. Earle*, 79, N. Y. Bot. Gard. Herb.

5. *S. castaneum* Burt, n. sp.

Type: in Mo. Bot. Gard. Herb.

Fructification resupinate, effused, coriaceous, dry, not separable from the substratum, glabrous, cracking in drying into pieces about 10×5 mm., olive-brown when fertile, Vandyke brown when in vegetative condition, the margin concolorous; in structure 3-layered, with (1) a layer next to substratum of opaque, concolorous hyphae 4μ in diameter, which form (2) a layer of pillared or spongy structure, in some places with pillars up to 150μ in diameter, about 1 mm. apart, and in other places with a spongy mass of obliquely ascending, interwoven hyphae similar to those of the pillars.

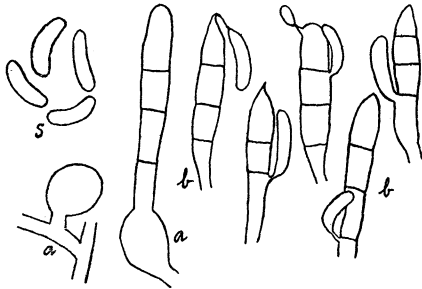


Fig. 4

S. castaneum.

a, two probasidia, one persistent at base of the spore-bearing organ which grows from it; *b*, six spore-bearing organs; *s*, spores. $\times 640$.

This layer supports (3) the hymenial crust, sometimes stratose, with hyphae loosely interwoven on the under side, $3-4\mu$ in diameter, very dense at the outer surface, with the hyphal branches or paraphyses 2μ in diameter, curved longitudinally along the surface and densely interwoven; erect probasidia slightly colored, rich in protoplasm, deeply staining, pyriform, $11-15 \times 9-10\mu$,

are borne laterally on the hyphae about 15μ below the surface of the hymenium; spores hyaline, simple, even, curved, $12 \times 3-3\frac{1}{2}\mu$, borne singly from each of the upper four cells of a straight, few-celled, even-walled, clavate, hyaline organ $30-40 \times 6\mu$, which grows from the probasidium and protrudes above the surface of the hymenium.

Fructification 8-15 cm. long, wholly surrounding limbs $2\frac{1}{2}$ cm. in diameter, $1-1\frac{1}{2}$ mm. thick.

On living bark in swamp, Montgomery, Alabama. May and August—fertile in May.

This species is closely related to *S. pseudopedicellatum* but is more deeply colored, has more opaque hyphae, and smaller spores and spore-bearing organs. No lateral protuberances or papillae have been observed on the latter.

Specimens examined:

Alabama: Montgomery, *R. P. Burke*, two collections (in Mo. Bot. Gard. Herb., 20421, type, and 20693).

6. *S. sublilacinum* (Ellis & Ev.) Burt, n. comb.

Thelephora sublilacina Ellis & Ev. State Univ. Iowa, Lab. Nat. Sci. Bul. 13:67. 1896; Sacc. Syll. Fung. 14:214. 1900.

Type: in N. Y. Bot. Gard. Herb.

Fructification resupinate, effused, coriaceous, dry, not separable from the substratum, glabrous, shining, olive-brown, darkening to dark neutral gray; in structure 3-layered, with (1) a layer next to the substratum, 40–60 μ thick, of closely crowded, longitudinally arranged hyphae concolorous with the fructification, 4–4½ μ in diameter, which form (2) a layer of pillars 40–60 μ in diameter, about 2–4 to a millimeter, whose hyphae spread apart at the outer end and form and support (3) the hymenial crust about 60 μ thick, densely interwoven throughout, with even, thick-walled, concolorous hyphae 3–3½ μ in diameter on the under side, 2 μ in diameter, nearly hyaline, and densely, longitudinally interwoven at the surface; probasidia, spores or other organs not present in the type.

Fructification about ½ cm. in diameter, ¾ mm. thick.

On living branches. Nicaragua.

The type specimen of this species, when viewed from above, agrees so closely with the cotype of *S. Spongia* in color and habit that one is strongly disposed to regard the two specimens as of the same species. *S. sublilacinum* has, however, the coarser hyphae, a three-layered structure, and distinct pillars. It seems best to regard it as a distinct species, at least until fertile specimens define the species more definitely.

Specimens examined:

Nicaragua: *C. L. Smith*, 108, type (in N. Y. Bot. Gard. Herb.).

7. *S. Patouillardii* Burt, n. sp.

S. (very near) *Leprieurii* (Mont.) Patouillard, Soc. Myc. Fr. Bul. 16:55. 1900.

Type: in Burt Herb.

Fructification resupinate, effused, coriaceous, dry, velutinous, aniline-black at first, becoming fuscous in the herbarium, the margin rather thick and determinate; in struc-

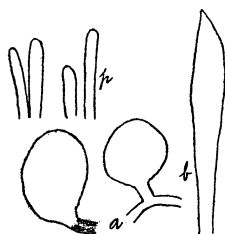


Fig. 5

S. Patouillardii.

a, two probasidia; *b*, spore-bearing organ; *p*, four paraphyses or hyphal ends. $\times 640$.

ture 200–400 μ thick, with (1) next to the substratum a thin layer of loosely interwoven hyphae 3 μ in diameter, buffy brown under the microscope, which form (2) a layer of hyphal pillars each about 30–50 μ in diameter, 100–200 μ long, about 3–4 to a millimeter, whose hyphae spread apart above and form (3) the interwoven hymenial layer containing some probasidia and with the surface composed of numerous erect, nearly straight, fuscous hyphal branches or paraphyses 2 μ in diameter; probasidia hyaline, subglobose, 15–20 μ in

diameter, erect on short branches of the colored hyphae; no spores found; the only possible spore-bearing organ seen is $46 \times 7\frac{1}{2}\mu$, acuminate at the apex.

Fructifications 2–3 $\frac{1}{2}$ cm. long, 1–2 cm. broad, 200–400 mm. thick.

On living branches of ash, *Liquidambar*, and *Nyssa*. Florida to Louisiana. November to March; a January collection has a few probasidia.

This species may be recognized by its thin fructification resembling a piece of black velvet, slightly raised from the substratum on such short and slender pillars as to be barely visible without the aid of a lens. Patouillard determined this species for Mr. Langlois as very near to *S. Leprieurii*. Since *Corticium Leprieurii* was originally described as glabrous, shining, and chocolate-colored, and since no specimens like ours have yet been collected in the region between Guiana and the United States, our specimens are probably a distinct species which should have a definite name.

Specimens examined:

Florida: Daytona, *R. Thaxter*, 75b (in Farlow Herb. and Mo. Bot. Gard. Herb., 43895).

Alabama: Auburn, *F. S. Earle & C. F. Baker*, also (in Mo. Bot. Gard. Herb., 5165).

Louisiana: St. Martinville, *A. B. Langlois*, 3005, determined by Patouillard as *S.* (very near) *Leprieurii*; Gibson, *F. T. McLean*, comm. by P. Spaulding, type—some fragments near a specimen of another species, but having probasidia, etc., as drawn, taken as the type because more mature than other collections cited.

8. *S. jamaicaense* Burt, n. sp.

Type: in Burt Herb. and N. Y. Bot. Gard. Herb.

Fructification resupinate, effused, coriaceous, spongy, dry, thick, bister, with the subiculum bone-brown; in structure with (1) next to the substratum a thin layer of interwoven hyphae which form (2) a layer of probably oblique, weak, very slender, crowded, hyphal pillars 12–20 μ in diameter, up to 2000 μ long, with hyphae even, 4–5 μ in diameter, buffy brown under the microscope, diverging above to form (3) a spongy hymenial layer 300–400 μ thick, with hyphae which rise obliquely, are loosely interwoven, and bear probasidia laterally at the outer surface of the layer and terminate in hyaline or subhyaline, curved branches or tips; probasidia hyaline, subglobose or pyriform, 13–25 \times 10–13 μ , quickly developing into hyaline, straight, few-celled, spore-bearing organs up to 60 \times 11 μ ; spores simple, hyaline, slightly curved, 13 \times 5½ μ .

Fructification larger than 6 cm. long, 2 cm. broad, 1–1½ mm. thick—fractured on all sides and not showing natural margin.

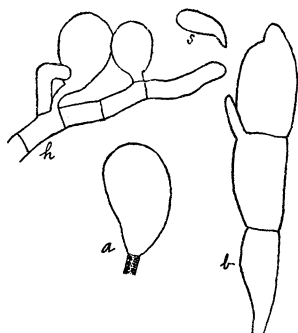


Fig. 6

S. jamaicaense.

h, hyphal end bearing two probasidia in the surface of the hymenium; *a*, probasidium; *b*, spore-bearing organ; *s*, spore. $\times 640$.

On bark. Base of John Crow Peak, altitude 5500 feet. Jamaica. April.

The type of this species has so thick and spongy a hymenial layer that I have tried to regard this specimen as the fertile stage of *S. Spongia*, but the well-developed layer of pillars is in the way of such reference and the hyphae are rather coarser than in *S. Spongia*.

Specimens examined:

Jamaica: John Crow Peak, *L. M. Underwood*, 2439.

9. *S. atratum* Patouillard, Soc. Myc. Fr. Bul. 16:181. 1900.

Type: location unknown.

Fructification resupinate, greatly extended, glabrous, shining, thin, with the margin fimbriate and incrusting; subiculum black, formed of rigid, erect, short bundles composed of hyphae but little branched, 4–5 μ in diameter, with the wall thick and brown under the microscope; hymenial crust thin, fragile, continuous, glabrous, ombre noir, paler at the periphery; probasidia at first globose, 10–12 μ in diameter, growing on the sides of erect hyphae of the hymenial crust a little below their ends; spores and spore-bearing organs not present.

On living trunk of *Eugenia Jambos*. Morne Gommier, near Galion, Guadeloupe. *P. Duss.*

In connection with the original description, Patouillard stated that *S. Spongia* is "epais, roux, spongieux, lacuneux," and that *S. atratum* is "tres mince, et noir." I have seen no specimens of *S. atratum* and base the above account of this species wholly on the original description.

10. *S. cirratum* Burt, n. sp.

Type: in Mo. Bot. Gard. Herb. and Humphrey Herb.

Fructification resupinate, effused, coriaceous, spongy, dry, cracked, velutinous, between Benzo-brown and brownish drab, with fuscous subiculum, the margin divided into narrow, sinuous divisions; in structure up to 700 μ thick, with (1) next to the substratum a layer of interwoven hyphae, which form (2) a layer of pillars not uniform in diameter, composed of hyphae loosely interwoven, curled together,

suggestive of ringlets in sectional preparations, which support (3) the hymenial layer 200–300 μ thick, with hyphae 2–2½ μ in diameter, notably curved, branched, and loosely interwoven, olive-brown under the microscope, bearing in the lower part of the layer numerous concolorous, globose bodies 11 μ in diameter, and toward the outer surface hyaline probasidia 11 μ in diameter also, and terminating at the surface in fine, hyaline branches 1 μ in diameter, with recurved or coiled tips; spores simple, hyaline, even, curved, 18 \times 6 μ ; spore-bearing organs few-celled, straight, cylindric, about 35–40 \times 7½ μ , differentiating from the probasidia.

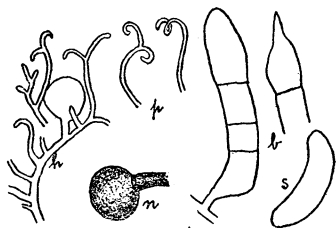


Fig. 7

S. cirratum.

h, portion of hymenium showing hypha bearing paraphyses and a probasidium; *b*, spore-bearing organs; *n*, colored body from deeper portion of hymenial layer; *p*, two paraphyses; *s*, spore. \times 640.

Fructifications 5 cm. long, 1½ cm. broad.

On trunk of living hardwood tree near the base. Cuba. December. Seen but once by the collector.

S. cirratum has so nearly the color and habit of *Hypochnus fuscus* that it was a surprise to find the specimen a *Septobasidium*. The color and sinuously divided margin suggest *S. Langloisii*. The pillars composed of loosely interwoven and curving hyphae are unique and separate this species sharply from all our species of the *S. pedicellatum* group. The hyphae are too fine and too curving for *S. Spongia*.

Specimens examined:

Cuba: Omaja, *C. J. Humphrey*, 2773 (in Mo. Bot. Gard. Herb., 15836).

11. *S. Langloisii* Patouillard, Soc. Myc. Fr. Bul. 16:54. 1900.

Type: a portion in Burt Herb.

Fructification resupinate, effused, dry, velutinous, plumbeous when bright colored, but often smoke-gray or pallid mouse-gray, repeatedly divided into many narrow, sinuous

divisions which are more distinct towards the margin; in structure 200–250 μ thick, with hyphae fuscous under the microscope, thick-walled, even, loosely interwoven from substratum to hymenium, densely interwoven in the hymenium and bearing hyaline, flexuous, suberect terminal branches or paraphyses and hyaline probasidia which are exceeded by the paraphyses; spores hyaline, simple, even, slightly curved, 15–21 \times 5–7½ μ , apparently produced singly at the

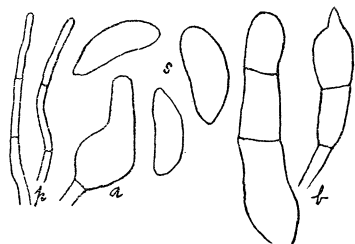


Fig. 8

S. Langloisii.

a, probasidium forming a spore-bearing organ; *b*, two spore-bearing organs; *p*, paraphyses; *s*, spores. \times 640.

apex of a nearly straight, 2–3-celled, spore-bearing organ into which the probasidium develops.

Fructification up to 5 cm. long, 2½ cm. broad, ¼ mm. thick.

On bark of living branches of *Crataegus*, *Carpinus*, and water oak. Florida to Louisiana and in Grenada. November to May.

This species resembles *S. frustulosum* in having the fructification divided into narrow sinuous divisions and differs from that species in being blue colored, verging into smoke-gray or paler in some specimens, instead of honey-yellow. The specimen from Grenada is thinner than those from other localities.

Specimens examined:

Exsiccati: Ravenel, Fungi Am., 450, under the name *Stereum pruinatum*.

Florida: Gainesville, *H. E. Stevens*, comm. by E. Bartholomew, 40a (in Mo. Bot. Gard. Herb., 44211); same locality, *Ravenel*, in Ravenel, Fungi Am., 450.

Alabama: Montgomery, *R. P. Burke*, 52 (in Mo. Bot. Gard. Herb., 9558).

Louisiana: St. Martinville, *A. B. Langlois*, 2995, type.

Grenada: Grand Etang, *R. Thaxter*, comm. by W. G. Farlow, a (in Mo. Bot. Gard. Herb., 43912).

12. *S. frustulosum* (Berk. & Curtis) Patouillard, Soc. Myc. Fr. Bul. 10:79. *pl. 3. f. 4.* 1894.

Hymenochaete frustulosa Berk. & Curtis, Linn. Soc. Bot. Jour. 10:334. 1868; Sacc. Syll. Fung. 6:601. 1888.

Illustrations: Patouillard, *loc. cit.*

Type: type and cotype in Kew Herb. and Curtis Herb.

Fructification resupinate, effused, coriaceous, dry, velutinous, honey-yellow to old gold, repeatedly divided into many narrow, sinuous, reticulate divisions which are more distinct towards the margin; in structure about $600\text{--}700\mu$ thick, 3-layered, with next to the substratum a broad layer, up to 200μ thick, with hyphae densely longitudinally arranged, 2μ in diameter, concolorous with the fructification, which ascend, without forming pillars, as (2) the loosely arranged middle layer, whose hyphae pass into and form (3) the hymenial crust which is finally very dense and compact in fully developed specimens, about 200μ thick, with hyphae concolorous, even, $1\frac{1}{2}\text{--}2\mu$ in diameter, branching towards the surface into flexuous branches, or paraphyses, about 1μ in diameter, once or twice dichotomously branched and with tips curved or spirally coiled; probasidia borne laterally on the hyphae, hyaline, pyriform, $9 \times 5\frac{1}{2}\mu$, becoming elongated and septate as a few-celled, spore-bearing organ, or producing directly a sterigma bearing one spore; spores hyaline, even, cylindric, nearly straight, $13\text{--}17 \times 4\text{--}5\mu$.

Fructifications up to 10 cm. long, 1–2 cm. broad, less than 1 mm. thick.

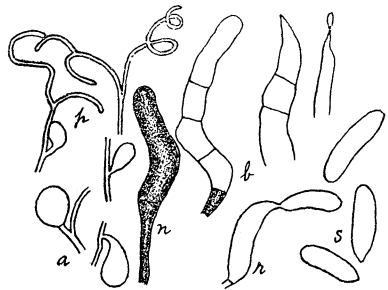


Fig. 9

S. frustulosum.

a, probasidia; *b*, three spore-bearing organs; *n*, septate colored organ; *p*, paraphyses; *r*, probasidium bearing a spore; *s*, spores. $\times 640$.

On bark of living limbs of frondose species. Mexico, West Indies, and Venezuela. February, March, November; spore-bearing in November.

This species is highly distinguished by honey-yellow color and the division of its fructification into narrow, sinuous, branched divisions, resembling those of the thallus of the lichens, *Physcia stellaris* and *P. obscura*. Spore-bearing organs are not abundant in the only fertile specimen which I have seen. They appear to become somewhat corkscrew-shaped, with no indication of bearing spores except on the terminal cell, but I was not certain on this point because the occasional attached spores were along the edge of thick sections where only the apex of the organ extended beyond the paraphyses. In two cases probasidia were bearing at the apex, each a body of the form and dimensions of a spore of this species. In the deeper portions of the fructifications brown, pyriform bodies of the same size and form as the probasidia are borne by the hyphae in the same location as the probasidia. These brown organs are often of the same dimensions as the spore-bearing organs, septate, and gorged with brown contents.

Specimens examined:

Exsiccati: Smith, Cent. Am. Fungi, 100, under the name *Thelephora retiformis*.

Mexico: Sanborn, Oaxaca, *C. R. Orcutt*, 3334 (in Mo. Bot. Gard. Herb.).

Nicaragua: Castillo Viejo, *C. L. Smith*, in Smith, Cent. Am. Fungi, 100.

Cuba: *C. Wright*, 244, cotype (in Curtis Herb.).

Grenada: Grand Etang, *R. Thaxter*, comm. by W. G. Farlow, 11.

Venezuela: *Fendler*, 279 (in Farlow Herb. and in Mo. Bot. Gard. Herb., 20411).

13. *S. retiforme* (Berk. & Curtis) Patouillard, Soc. Myc. Fr. Bul. 16: 55. 1900.

Thelephora retiformis Berk. & Curtis, Linn. Soc. Bot. Jour. 10:330. 1868; Sacc. Syll. Fung. 6:544. 1888.

Type: type and cotype in Kew Herb. and Curtis Herb.

Fructification resupinate, effused, coriaceous, at first drab or Prout's brown, then Chaetura-drab, the hymenial surface reticulated with obtuse veins, pulverulent; in structure 700μ thick, with the hyphae colored, $3-4\mu$ in diameter, short-celled, loosely interwoven or rising obliquely from substratum to hymenial surface and there densely interwoven longitudinally and bearing laterally brown, globose or pyriform bodies $13-15 \times 10-13\mu$, and slightly colored probasidia of the same size and form; a single spore in the hymenial surface is hyaline, even, curved, $15 \times 4\mu$; no spore-bearing organs found.

Fructification 1-4 cm. long, about 700μ thick.

On living branches of apple, pear, peach, *Carya*. District of Columbia to Louisiana and Cuba. November to February, producing probasidia in February.

S. retiforme resembles a small foliaceous lichen in habit. It may be distinguished from our other species by its drab to brown color and reticulately veined hymenial surface. The spore characters stated are uncertain for only one spore was seen.

Specimens examined:

Exsiccati: Ellis & Ev., N. Am. Fungi, 2604.

District of Columbia: Washington, comm. by Mrs. F. W. Patterson.

Georgia: Fort Valley, comm. by Mrs. F. W. Patterson.

Alabama: Forestdale, C. C. Woodward, comm. by J. B. Rorer; Abbeville, S. T. Slaton (also in Lloyd Herb., 3460, and in Mo. Bot. Gard. Herb., 5166).

Louisiana: St. Martinville, A. B. Langlois, 2233.

Cuba: C. Wright, 288, cotype (in Curtis Herb.).

14. *S. Spongia* (Berk. & Curtis) Patouillard, Soc. Myc. Fr. Bul. 16:181. 1900.

Thelephora Spongia Berk. & Curtis, Linn. Soc. Bot. Jour. 10:330. 1868; Sacc. Syll. Fung. 6:542. 1888.

Type: type and cotype in Kew Herb. and Curtis Herb.



Fig. 10
S. retiforme.
a, probasidium; *n*, colored organ; *s*, spore. $\times 640$.

Fructification resupinate, effused, not separable from the substratum, dry, glabrous, shining, between mouse-gray and hair-brown, the margin strigose; in structure lacunose, spongy, about 1 mm. thick when dry, distending to $1\frac{1}{2}$ –2 mm. when moistened, with hyphae $3\text{--}3\frac{1}{2}\mu$ in diameter, fuscous to clove-brown under the microscope, densely longitudinally arranged in masses along the substratum and rising obliquely so as to form a spongy structure with vacant spaces up to $800 \times 500\mu$, united above into a continuous hymenial crust $40\text{--}80\mu$ thick; probasidia, spores, and spore-bearing organs not present.



Fig. 11

S. Spongia.

Vertical section of fructification showing spongy structure. $\times 9$.

Fructification "spreading for many inches," $1\frac{1}{2}$ –2 mm. thick.

On bark of cacao trees. Cuba.

S. Spongia is distinguished from our other species in the group having a glabrous hymenial crust by the spongy, rather than pillared, structure of the middle region of the fructification. The surface of the cotype is infested with a colorless hyphomycete whose hyphae are densely crowded together and agglutinated; hence fertile specimens of this species will probably be browner than the original sterile, infested specimen.

Specimens examined:

Cuba: *C. Wright*, 566, cotype (in Curtis Herb., and a portion in Mo. Bot. Gard. Herb., 44592, by kindness of Dr. Farlow).

? Mexico: Monterey, Sierra Madre, *C. G. Pringle*, comm. by W. G. Farlow, 6 (in Mo. Bot. Gard. Herb., 44591).

15. *S. fumigatum* Burt, n. sp.

Type: in Mo. Bot. Gard. Herb. and Humphrey Herb.

Fructification resupinate, long and broadly effused, not separable from substratum, coriaceous, tomentose, between mouse-gray and hair-brown, rarely with surface pale, the margin thinning out and concolorous; in structure $800\text{--}1500\mu$ thick, with hyphae buffy brown under the microscope, even, thick-walled, 4μ in diameter, loosely interwoven and ascend-

ing from substratum to hymenial region; in the hymenial region the hyphae become more densely interwoven and bear laterally numerous hyaline, subglobose probasidia $12\text{--}15\mu$ in diameter, and terminate in small, curved or loosely coiled, colored branches—hardly paraphyses— 2μ in diameter, which form the surface of the hymenium; spores simple, hyaline, even, slightly curved, $12\text{--}15 \times 5\text{--}6\mu$, borne on the upper three cells of a few-celled, nearly straight, hyaline, spore-bearing organ $40\text{--}50 \times 6\text{--}7\frac{1}{2}\mu$, into which the probasidium develops.

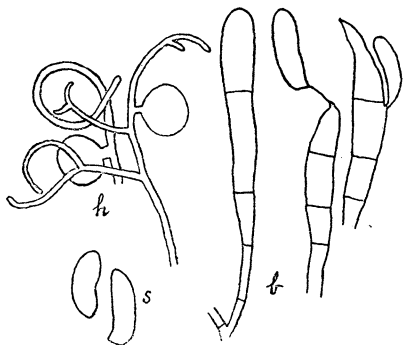


Fig. 12

S. fumigatum.

h, portion of hymenium showing hyphae bearing probasidia and terminating in curved and coiled ends; *b*, three spore-bearing organs; *s*, spores. $\times 640$.

Up to 5 m. long, several cm. broad, $\frac{4}{5}\text{--}1\frac{1}{2}$ mm. thick.

On trunks of living sapling of *Acer rubrum* and probably other species. South Carolina, Alabama, and Cuba. November to May; spores most numerous in May.

S. fumigatum has the general habit and color of *Hypochynus spongiosus* and is readily distinguishable among the North American species of *Septobasidium* by its mouse-gray color, tomentose surface, and felty structure of loosely interwoven hyphae which do not form pillars. It is only rarely that I have seen spores or evidences of spore production upon other than the terminal cell in this species.

Specimens examined:

South Carolina: Gourdin, *C. J. Humphrey*, 2588, type (in Mo. Bot. Gard. Herb., 43822).

Alabama: Montgomery, *R. P. Burke*, 50, and an *unnumbered collection* (in Mo. Bot. Gard. Herb., 11382, 20068).

Cuba: *C. Wright*, *Fungi Cubenses Wrightiani*, 838, comm. by W. G. Farlow (in Farlow Herb. and Mo. Bot. Gard. Herb., 43907).

16. *S. canescens* Burt, n. sp.

Type: in Mo. Bot. Gard. Herb.

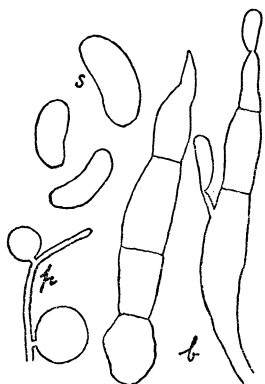


Fig. 13

S. canescens.
p, hypha in hymenial surface bearing probasidia; b, two spore-bearing organs; s, spores. $\times 640$.

Fructification resupinate, effused, coriaceous, cottony, pubescent, white at first, pale olive-buff in the herbarium, the margin thinning out; in structure 500–900 μ thick, with the hyphae hyaline, even, 4½ μ in diameter, densely interwoven next to the substratum, suberect, or ascending obliquely and loosely interwoven to the hymenial surface and there bearing probasidia laterally among slightly curved hyphal branches about 2 μ in diameter; probasidia hyaline, subglobose, 15–17 μ in diameter, producing a few-celled organ 7½ μ in diameter, up to 60 μ long, which bears spores on its

upper three cells; spores simple, hyaline, even, curved, 15–20 \times 5½–6 μ .

Fructifications about 2–4 cm. long, 1–1½ cm. broad, sometimes arranged more or less interruptedly for up to 25 cm. along the under side of limbs.

Associated fairly constantly with scale insects on small living branches of *Quercus* on a residence street, Pasadena, California. November to March.

S. canescens is characterized by its white to whitish color, cottony structure, and pubescent surface. Spores were observed attached to one or more of the upper three cells of the spore-bearing organ but with the terminal cell giving the most indication of spore production. I am indebted to Prof. H. S. Fawcett for the collection made in March to show this species in best fruiting condition.

Specimens examined:

California: Pasadena, *H. S. Fawcett*, comm. by W. A. Setchell (in Mo. Bot. Gard. Herb., 44037); same locality, *A. G. Smith*, comm. by H. S. Fawcett (in Mo. Bot. Gard. Herb., 44246).

17. *S. lilacinum* Burt, n. sp.

Type: in Farlow Herb. and Burt Herb.

Fructification resupinate, effused, coriaceous, dry, adnate, velutinous, between lilac-gray and pallid smoke-gray, the margin adnate, fimbriate; in structure 80–200 μ thick, with hyphae thin-walled, 2–2½ μ in diameter, somewhat colored near the substratum, ascending and interwoven and becoming hyaline towards the hymenium, finer, 1½ μ in diameter, and bearing laterally probasidia, and extending beyond the probasidia and branching, with tips curved to form the velvety surface of the hymenium; probasidia hyaline, even, globose, up to 9 μ in diameter; spores simple, hyaline, even, slightly curved, 11–13 \times 3½–4½ μ , borne on a few-celled, spore-bearing organ about 20–30 \times 4–5 μ , slightly curved at first.

Fructifications more than 6 cm. long, more than 1½ cm. wide.

On bark, Maravals, Trinidad, West Indies.

This species is characterized by its very thin, velvety fructification, pallid smoke-gray with a slight lilac tint, fine hyphae, and small probasidia, spore-bearing organs, and spores. The spore-bearing organs were slightly curved in all cases where spores were attached to them; in the sections some of these organs appeared strongly curved or hook-shaped but my preparations did not demonstrate this point positively, for the numerous curved hyphal branches were confusing.

Specimens examined:

Trinidad: Maravals, *R. Thaxter*, comm. by W. G. Farlow, 28, type.

(To be continued.)

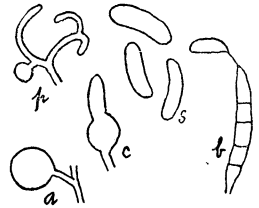


Fig. 14

S. lilacinum.

p, hyaline portion of hypha in hymenial surface bearing a probasidium; *a*, mature probasidium; *c*, probasidium with young spore-bearing organ; *b*, spore-bearing organ; *s*, spores. \times 640.